Cross-cultural aspects of using a virtual learning environment

The evaluation of a virtual campus website by users from North-America, England, the Netherlands and Japan

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1. INTRODUCTION

The research field of usability is relatively young and to a large extent driven by industry demand and effort. Even though many of the user evaluation techniques stem from traditional qualitative social research, one could say that the nature of methods such as laboratory user observations and remote user experiments are closer to traditional industry marketing research efforts than scientific social research. More and more, companies start to realise that users are accessing their sites from all over the world. More recently, the development of local websites for target markets has become a way to enter the global economy and gain a larger international market share. Assuming there is a need for the products or services offered in the target locale, the competitive position of a company will depend largely on the quality of the website's user experience. Heuristics and design guidelines exist for the development of usable websites (for example Nielsen, 1993 and Preece et al, 2002). However, these guidelines seem to be mostly developed by North-American contributors based on experience with North-American users. North America is known as a predominantly individualistic society where people are comfortable expressing their opinion and emotions and are uncomfortable with ambiguous information. However, as we travel from country to country, the societies we encounter are very different. It is on this basis that the author wonders whether traditional usability guidelines and usability testing techniques are appropriate for cross-cultural usability research.

As found by Sears et al. (2002, page 242), few studies have carefully studied cultural differences as they relate to the perceived usability of the web. This finding leads to two important questions. Namely, how can we test the perceived usability of a website and how can we measure the impact of culture on perceived usability? These questions will be further explored in the following two sections.

1.1. User experience

Preece et al (2002, page 19) state that user experience goals are concerned with

how users' experience interactive products from their perspective and the more objective usability goals are used to assess the general usefulness or productiveness of a system. The usability goals identified were:

- Efficient to use
- Effective to use
- Safe to use
- Have good utility
- Easy to learn
- Easy to remember how to use

Website usability testing as described by Nielsen (2000) and Rubin (1994), involves observation of users as they carry out critical tasks. These tasks are the main tasks the site is designed to support (for example: buying a book). A website is deemed usable when the website supports the users in carrying out the task efficiently, effectively, safely and easily.

From the user's point of view, a website is used to fulfil a certain need. This can be to carry out a task (such as searching for information or purchasing something), communicate with others (i.e. through chat groups and newsgroups) or for entertainment (such as playing games, watching movies). For the purpose of the study reported in this paper, usability will be assessed by evaluating what problems users encounter when carrying out a critical task.

1.2. Cultural differences

When performing cross-cultural or international user research. How can we be sure that differences found are actually attributable to culture. In other words, can we use 'culture' as an independent variable? There are several ways to approach this problem, which will now be discussed in more detail.

One possibility is to focus on national culture and use a large enough sample so that quantitative analysis is possible. This has been carried out in studies such as those by Marcoulides and Wang (1991), Sensales and Greenfield (1995) and Weil and Rosen (1994). However, these type of studies usually make use of survey type methods. The self reported data this yields may not be the most appropriate when evaluating user behaviour and usability. Observation type methods will be more applicable to asses what really happens when the user interacts with the website.

Another possibility is to evaluate culture by using existing cultural models such as developed by Hofstede (1991), Trompenaars (1993) and Kluckhohn and Strodtbeck (1961). These researchers compare national cultures in terms of broad value

differences. These values or 'cultural variables' can be used to describe or categorise a culture. An example is individualism which indicates the concern for oneself as opposed to concern for the priorities and rules of the group to which you belong. North-American society for example, is often described as individualistic whereas Japanese society is seen as collectivist. The applicability of cultural variables to cross-cultural user research is discussed in more detail in Evers (2002). Cultural variables were found useful to understand the cultural background of the user and facilitate in developing research instruments, methods and procedures as well as predicting attitudes towards computers and websites but less useful in predicting user understanding. This was mostly due to the many external factors that influence Human-computer communication such as the context of the task to be carried out and the context of the website.

Another, more practical method to investigate culture is to approach the users of a target local market as a new user group. For an American company intending to develop a local version of their website for the Japanese market, this would mean forgetting everything they know about the current users and start information gathering from scratch. Even though the users work in similar companies, and carry out similar tasks they should be treated as a completely new and unknown user group. And the site redevelopment should happen accordingly.

A method often practiced in anthropological research is ethnography. This is where the researcher immerses him/herself completely in the users' culture and tries to build a picture of what the culture consists of. It would involve learning about all aspects of users' lives, not just focus on those tasks that involve the website. An advantage of this method is that it is very clear to see where a product fits into the user's life and what user needs are. A drawback is that ethnographic research is very time consuming.

The research reported in this paper investigated culture by investigating users from four different national cultures. In order to assess usability of the website and test the appropriateness of the method, traditional user observations were employed. To improve the reliability of the findings quite a large number of users were tested. In the following section the aim of the study will be discussed after which the methodology will be addressed in more detail.

2. PROBLEM STATEMENT

The findings from a Pilot Study carried out previously (Evers, 1999) suggested that participants' understanding of interfaces is influenced by knowledge of the real world around them. Trompenaars (1993) stated that 'a persons' cultural background

is learned, not inherited and is made up of experiences gained when growing up in his or her culture'. For the purpose of this study, the author therefore will make the assumption that the users' cultural background is comprised of real world experiences and that these experiences are used to understand the virtual world on the screen. To a certain extent, experience with other interfaces, may also shape understanding of interface elements. For example, if exposed to similar websites, the user may have certain expectations of what information will be available and so on.

The way in which an interface is understood by the user will influence the users' perception and expectations of individual interface elements. Understanding of the information they receive through the interface will also affect user behaviour and the perception of the site's usability. Figure 1 illustrates this in more detail.

The research stems from the premises that understanding of the interface and its individual elements will be influenced by the user's cultural background. This shapes the research proposition:

Research Proposition: User experience of a human computer interface is influenced by the cultural background of the user

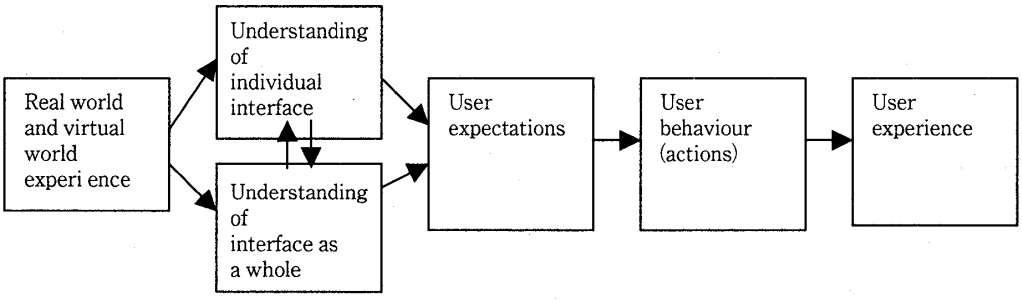

Figure 1: User's understanding of individual interface elements influences their understanding of the interface as a whole and vice versa. Understanding of the interface will shape the expectations a user has and a user will act accordingly. The experience the user has because of this interaction will then form the users perception of the website's usability.

The research aimed to establish to what extent differences in usability were due to cultural differences among the participants. The study was meant to employ traditional user observation methods to collect the data. In order to do so it would be necessary to design critical tasks for the users to perform while using the website. Instead of relying on the users' ability to self-report their understanding of the site, as in a survey, the research instead would provide information on how users actually behaved when using a particular website. The next section will discuss how these research propositions were addressed during the research.

3. METHODOLOGY

3.1. Sample selection

The sample in this study, 120 individuals from four different cultural backgrounds, was carefully selected. Apart from cultural background, it was thought important to attempt to control for some individual differences. An even number of boys and girls were chosen so that gender differences could be evaluated. Computer experience and economic background were moderately controlled for by choosing students from private fee-paying schools or schools of comparable level. These students were expected to have more computer exposure through well-equipped schools or availability of technology at home. All participants involved were around the age of 16 years old. This age was chosen because of the educational context of the DirectED website (i.e. that of a virtual campus). Sixteen year old high school students preparing to go to university were expected to be interested in finding out more about universities and would also have a pre-formed real world opinion of what a university is, probably without having actually experienced one specific university for any length of time.

3.2. Sample characteristics

The national cultures included in this research were Dutch, English, North American and Japanese. These nationalities were predominantly chosen because of differences in cultural background and differences in knowledge of English as a first language as well as a second language. North-American culture was assessed as a benchmark for the other cultural groups because of the generally North-American nature of computers and the Internet and the dominance of American English on the Internet. The English were involved because it was expected they would show differences in understanding English text components of the websites, even though they were also native English speakers. The English were also a convenient sample as the researcher resided in the UK. The choice was made to include another European group, non-native speakers of English. The Dutch were a convenient choice for this group as the researcher was born and raised in the Netherlands; this was expected to facilitate the research. The decision was also made to include a non-Western culture. In the search for ways to access a non-Western sample, the Japanese sample was chosen because the researcher discovered there was a Japanese boarding school in the UK. The students at this boarding school have limited interaction with the outside world and are able to maintain their traditional, religious and social activities within the school grounds. The Japanese culture was also thought to be distinctly different from the other three cultures involved.

The Japanese students were non-native English speakers expected to have less advanced knowledge of English compared to the Dutch participants. This difference

of knowledge was expected because Dutch students were thought to be exposed to English more through the formal school curriculum and the media. Also, the Dutch language is quite similar to the English language, especially when compared to Japanese. Differences in cultural backgrounds and the real worlds across the four groups were expected to influence participants' understanding of the DirectED website. Educational systems and the idea of 'being a student' differ considerably across the four cultural groups. The following sections will discuss the four cultural groups in more detail.

North American sample

The North American sample consisted of 15 boys and 15 girls of American nationality. Seventeen participants were 16 years of age, nine were 17 and four were 15.

All participants were evaluated at the St Paul's School for Boys and the St Paul's School for Girls in Maryland, USA. Both schools are situated on the same campus. Boys and girls attend separate classes in separate buildings, even though the school does provide mixed activities and classes where deemed appropriate. The St Paul's School is a renowned private fee-paying school and therefore the students are generally from economically affluent backgrounds. The school offers extensive computing facilities. Computer and Internet work is part of the school curriculum and more facilities are accessible out of class hours. The school is based upon a Christian ethos and provides for this each morning in the on-campus chapel. However, students of other religions are accepted and are exempt from Christian duties.

Japanese sample

The sample consisted of 15 boys and 15 girls of Japanese nationality. Four participants were 18 years old, eight participants were 17, ten participants were 16 and eight participants were 15. All of them had lived most of their lives in Japan and 1 to 5 years abroad in a local Japanese environment namely, a Japanese boarding school in England. As such, the Japanese participants were the only ones who were away from their 'home setting'. All participants were drawn from the Geiosy International School in Milton Keynes, UK. This is a private fee paying school offering Japanese education and also a course entirely in English to prepare students for life at an English or American college. All participants live and study at the school, which provides for their meals, leisure and religion. Because of this, interaction with the outside world is quite limited. The school had recently started upgrading their computer facilities and could not offer many computing facilities at the time of data collection. Most students had most of their computer experience while they were living in Japan. Religious practice and Japanese ceremonies are

provided for within the school grounds.

English sample

The sample consisted of 15 boys and 15 girls of English nationality. Five participants were 17 years old, 8 participants were 16, eleven participants were 15 and six participants were 14. All participants were drawn from the Bury Lawn School in Milton Keynes, UK. The Bury lawn school is a private fee paying school. It is not a boarding school and has no religious denomination. The School had limited computing facilities as the space and computers had become scarce after considerable growth in the number of students. However, all participants received formal computer and Internet training as part of the school curriculum. Because of the privileged economical background students generally belonged to, many students received most of their computer experience at home.

Dutch sample

The sample consisted of 15 boys and 15 girls of Dutch nationality. Twenty-two participants were 16 and eight were 15 years old. All participants were drawn from the public secondary school 't Rijks in Bergen op Zoom, the Netherlands. This is not a private fee paying school. When Dutch children leave primary school to receive secondary education (around the age of 13) they join a certain level of schooling according to their capabilities, which are assessed by tests. Participants were drawn from the third and highest educational level of the school involved ('athenaeum', the level that prepares students for university). This group was selected because the level of education of the students was thought to compare with those in the other cultural groups who received semi-privileged education. The school offers extensive computing facilities. Computer and Internet work is part of the school curriculum and facilities are accessible out of class hours.

3.3. Instruments

Directed website

The website evaluated in the study was that of DirectED virtual campus (see figure 2). The DirectED virtual campus website (www.DirecteED.edu/core.html) is a website of a Canadian company that offers distance learning courses over the web. The metaphor that is being used in the website's design is that of a campus as common for North American tertiary education. The website provides prospective students with information about DirectED and provides current students with online access to course material, tutors and exams.

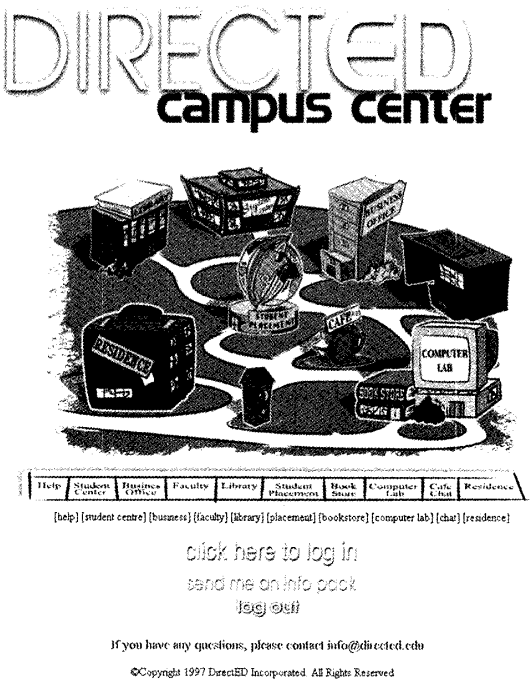

Figure 2. The DirectED virtual campus website

Background questionnaire

After an introduction to the study, the participants were asked to fill in a questionnaire, which consisted of 14 questions. The questions were designed to investigate the participant's background, computer experience, computer usage, Internet experience and Internet usage. The questions were included to gain insight into national-cultural differences in computer and Internet usage and also to investigate the influence of experience on the participants' understanding.

The questionnaire also asked questions about where the participants had lived most of their lives, the number of generations of their families in that country, if they grew up in an ethnically different neighbourhood (For example, a North-American growing up in 'China town' in an American city) and what languages the participants were familiar with. These questions were asked to gain insight into the extent to which the participant had been exposed to other cultures. This would occur for example when one parent is from a different country, when the participant has lived abroad or when the participant has knowledge of other cultures because of having studied another language.

Finally, questions were asked about the participants' cultural background, nationality, age and gender. These questions were designed to record some basic demographic information and to find out what the participant's own notion was of 'cultural background'.

Hands-on task observation session

For the observation sessions, a task sheet explained the need for the participant to be involved in role-playing (assume the role of a student that is about to finish secondary education and is attempting to find appropriate further education) and think aloud while evaluating the DirectED website to decide whether he or she would consider enrolling in this institution. The task was designed to ensure that the participant would evaluate the site thoroughly and critically. It was thought that in order to make up their mind about whether or not they would ever consider the institution, participants would have to gain an understanding of what the website was about. Students were asked to specifically mention what they were about to click on and why in order to gain insight into their understanding of individual interface elements. Think aloud protocols would provide insight into their understanding, decision process, information search strategies and attitudes.

Website evaluation feedback interview

The interview questions were designed to gain detailed insights into the way the website was evaluated and understood by the participants. Table 1 covers each of the questions in more detail.

The data collection was carried out in individual sessions of approximately 30-45 minutes each. For the Japanese this was 45 minutes to allow for translation. The Japanese translator in the UK carried out translation of the participants' responses into English and the researcher's questions into Japanese while attending each of the sessions. This translator had also assisted in translating the data-collection instrument. The sessions consisted of 5 parts: introduction, demographic and background data collection, a practical task in which the participants were observed while using the DirectED website and a short interview to collect feedback on the participants' understanding of the website.

In order to control the sessions that were conducted entirely in Japanese with the help of a Japanese interpreter, the researcher needed to develop a protocol to ensure each participant would receive the same amount of information and guidance. By restricting the interpreter in what he could tell the participants, the researcher was able to control the study without exactly knowing what was said. The structured set up made it clear when the interpreter was telling the participant what and therefore, participants' reactions could be noted in reference to the stage the session was at.

The study investigated national culture as an independent variable versus the participants' understanding as the dependent variable. After the data collection, tapes were transcribed and integrated with notes. Sometimes the verbal protocol on

the tapes was unclear and the notes would provide an important aid in understanding what the participant was saying. Because the study used a variety of methods, data was processed and analysed in a variety of ways, which will be discussed in the following.

Table 1. The questions in the website evaluation feedback interview and the rationale for each of the questions

The question	**The rationale for the question**
1. What was the DirectED website about?	This question was asked in order to gain better insight into participants' understanding of the general context of the site.
2. What would you normally look for in a university?	This question was asked to find out what participants would normally look for when deciding about further education. This information would enable the researcher to double-check with the observation data that recorded what they where searching for on the site. Comparing the two would show whether their decision process for a real world education centre was different from or similar to the decision process for a virtual world education centre.
3. Which of the things that you were looking for did you feel were missing on the site?	Again this question provided a double check on the extent to which participants applied their real world behaviour to their virtual world behaviour in looking at the website.
4. Would you consider studying at DirectED? (Why?)	This question was asked because it was the goal of the task session and would also provide insight into the participants' decision-making process.
5. What did you not like about the website?	This question was to gather information on all aspects that they found inappropriate or in need of improvement and also to find out about the participants' attitudes towards the site.
6. What did you like about the website?	The question was designed to find out about aspects of the site that the participants found appropriate and their attitudes towards the site.
7. Does the website remind you of a particular country?	This question was asked to find out if participants had been influenced by the cultural context of the website. Perhaps knowing that a site looks American would influence their opinion of or understanding of the site.

The questionnaire provided categorical self-reported questionnaire data on computer and Internet experience, computer and Internet use, the participant's demographics, language use and cultural background. This data was entered into and analysed with SPSS. The experience data and demographic data were analysed by frequency and averages to describe the samples involved in the study (For example, the average age of the North-American participants was 16 years).

For the task observation sessions, the first 5 icons the participant clicked on during their evaluation of the DirectED Website were recorded and mapped out by hand to find out about navigational patterns the participants employed while evaluating the site.

The users' verbal protocol was categorised with the qualitative analysis support

package NUDIST. For each of the groups involved, responses per design item (icon) were categorised in NUDIST (for example all the comments by the American participants about the Library icon were clustered). After this, the responses per item were categorised in four different categories:

- References to why participants clicked on the particular icon (to investigate navigation and search strategies).
- References to what information participants expected of the particular icon (to investigate understanding of individual icons on the website).
- References to participants' perception of what the information on the particular page of the icon was about (to investigate understanding of general contents of the website).
- References to participants' attitudes towards and opinions of the information and the design elements on the site (to investigate attitude towards the website and understanding of the general contents of the website)

The responses to the interview questions were clustered with the help of NUDIST and analysed by hand, per culture and per question with the aid of colour coding to categorise differences in responses. The following describes what each question investigated.

Additional observational data could also offer insights into computer and Internet usage across the groups, the local culture of the schools and population of the schools involved, physical behaviour during the observation such as facial expressions as well as attitudes towards the research and the website as expressed during the data collection sessions.

4. FINDINGS AND DISCUSSION

Participants' understanding of the text on the DirectED website was evaluated by reviewing the way they understood the labels of the icons and the text on the individual pages. This information was derived from the transcripts of the observation sessions in which the participants thought out loud while evaluating the DirectED website.

4.1. User experience

Experience of text

American participants did not have real difficulty in understanding the labels of the icons on the website. The labels 'Student Placement' and '?' (the Help System label) caused most problems in trying to establish what they represented. The label

'Student Placement' was found hard to understand because participants were unsure what to expect from this term. The same was true for the label of the icon with the question mark'?'.

The Japanese participants had considerable difficulty in trying to understand the labels on the website. They felt insecure about their knowledge of English and were often frustrated by seeing all the text on the website in English. Labels that were considered most incomprehensible were 'Faculty', 'Student Placement' and 'Residence'. The reason for this was that the words faculty, placement and residence were not words they were very familiar with. Even though some participants had a vague notion of what the words could mean, they felt unsure about what the labels represented.

The English participants did not have as much difficulty in understanding the labels on the screen. Difficulty in understanding mostly arose when terms had different meanings in American English (such as 'Faculty'), or where the metaphor clashed with the concept of distance learning ('Residence', which reminded them of 'halls of residence' which contradicted the notion of distance learning). Labels that were most often interpreted in a different way than was intended by DirectED were 'Faculty', 'Student Placement' and '?'. Faculty was not found hard to understand (most thought it would represent courses or participants in faculties such as faculty of history and so on) but was interpreted wrongly because of the different meaning in British English. Student Placement was associated with courses and the question mark was associated with information rather than help.

Dutch participants' difficulties in understanding the labels were mostly concentrated on cases where they felt unsure of a word's translation. Sometimes, a word was similar to a Dutch word with a different meaning (such as 'Faculty' or 'Café'). Labels most often misunderstood were 'Faculty', 'Café Chat', 'Residence', 'Student Placement', '?'. Faculty was misunderstood, because of its similarity to a Dutch word with a different meaning. Café Chat was misunderstood, because it was associated with going out rather than Internet chat. Residence (similar to the Dutch word 'residentie', place of residence) was misunderstood because it was associated with housing rather than students and Student Placement because it was associated with where one would physically be placed rather than jobs. Most likely the word 'student' was understood, the word placement was expected to have something to do with the word 'place' (a word they knew) but the combination of the two terms was found quite puzzling.

It seems that there were differences in reasons for misunderstanding among the groups. The Americans had difficulties mostly where labels did not match their idea

of what a campus consists of. The Japanese participants' difficulties were mostly related to problems in understanding the English words. The Dutch participants' misunderstandings of labels arose through similarities of the labels with Dutch words of different meaning (false friends) and difficulty with combined terms. For the English also, false friends caused misunderstanding as well as concepts they were not familiar with in their experiences with education.

Participants had problems in understanding text on the individual pages. Japanese had difficulty reading and understanding English and for the Dutch as well it was considered an effort to read what was on a page. Because of this, Japanese and Dutch participants often glanced at a page rather than actually reading the text, which meant that their understanding of the page was mostly formed by headings, bullet points and graphics. This is an interesting finding, which suggests that 'foreign' users may judge an interface by its headings, bullet points and graphics. For the American and English participants it caused no effort to read the English text but the amount of text on a page was often found too much to read and pages were regularly considered 'boring'. In scanning headings, attention was concentrated on those that reminded participants of something familiar. This was different for each of the groups and predominantly the Americans found most meaning in the terms.

The influence of language experience on understanding text

Knowledge of English was found to influence understanding because as participants encountered familiar words, expectations of information and functionality would start to form. When a familiar word or term was encountered, participants would start associating the item on the screen with information and actions they would expect from the concept they were familiar with (for example student centre).

Experience of graphics

Participants' understanding of the graphics on the DirectED website consisted of the way they understood the graphics of the icons and other graphics on the individual pages such as photographs, pictures, drawings and so on.

The Americans derived most of their understanding of the website from text. In some cases the graphics influenced their understanding of a particular icon, especially the graphic of the Residence (suitcase), Student Placement (globe), Café Chat (coffee cup) and Computer Lab (computer). In these cases the graphics strengthened their idea of a place to sleep, a physical place, a place to relax or get something to eat, and see what hardware/technology is physically available on campus. Sometimes, these notions were contrary to the distance-learning context and caused serious confusion during the evaluation of the site.

In contrast to the Americans, the Japanese derived most of their understanding of the icons from the graphics. This was often because the labels were not understood. The graphics that especially seemed to influence understanding of the particular icon as a whole were the graphics of the Faculty (desk), Student Placement (globe), Residence (suitcase), Café Chat (coffee cup), Computer Lab (computer) and Bookstore (books).

As with the Americans, the English based their understanding mostly on the labels of the icons. Graphics sometimes added to their understanding of what an icon represented, such as the graphics for Student Placement (globe), Café Chat (coffee cup) and Computer Lab (computer). The graphics seemed to make the English feel surer about their understanding of the icons in that they represented certain places, such as a place to go with friends and have coffee and what technology is available.

The Dutch participants were slightly more influenced by the graphics than the Americans and the English were even if not as much as was the case for the Japanese. Graphics that influenced understanding for the Dutch were the Faculty graphic (desk), Student Placement (globe), Residence (suitcase), Café Chat (coffee cup) and Computer Lab (computer). It reminded them of courses, studying abroad, travel or accommodation, coffee or going out, and computers.

Graphics had most influence on understanding for the Japanese and the Dutch. This is interesting since these groups were both non-native speakers of English. Analysis indicates that knowledge of English indeed influences understanding of interfaces. Non-native speakers of English who were having trouble understanding the textual elements of the interface were most likely forced to rely on their understanding of pictures to establish the intentions of the interface.

The influence of real world experience on understanding graphics

Users' real world experiences seemed to influence participants understanding of graphics and also of text. Once a design item, whether text, graphic or both was associated with a certain context (for example, education), participants' real world experiences with this context influenced their understanding of what information and functionality to expect from the design item. For example, expectations of Student Centres differed across the groups according to real world experience participants had with education and universities.

The influence graphics had on the understanding of interface design was found to differ across the groups. For the Americans and English, the graphics did not seem to impact understanding much. However, for the Dutch and Japanese, understanding of graphics did influence understanding of the design item. Choong

and Salvendy (1998) found in their icon recognition study that Chinese participants were found to perform more efficiently with pictorial rather than alphanumerical modes. They too seemed comfortable with high context information. A possible reason for this was thought to be knowledge of English. Where participants find it hard to understand the English labels, graphics are thought to play a more important role in understanding of the interface. It needs to be kept in mind that the research in this thesis investigated a particular style of graphics. Rather than photos or life-like artwork, the graphics in this study were cartoon style drawings. Even though the findings showed interesting differences across the cultures involved, it may be that the findings related to graphics in this study are less generalisable than those related to text. Given that graphics are unique and often serve unique purposes (i.e. a graphic of a building will often look different whereas the English word 'student' will be the same even if understood differently), caution is needed when generalising findings for user understanding of graphics.

Throughout the research, it became clear that the participants did not always understand the concept the designers attempted to convey through the interface's design. Reasons for this misunderstanding were found to be differences in associations and expectations influenced by knowledge of English, real world experiences with similar concepts (i.e. education). Figure 3 illustrates the notion that misunderstanding interfaces is more likely to arise when the background of the user and the designer do not match.

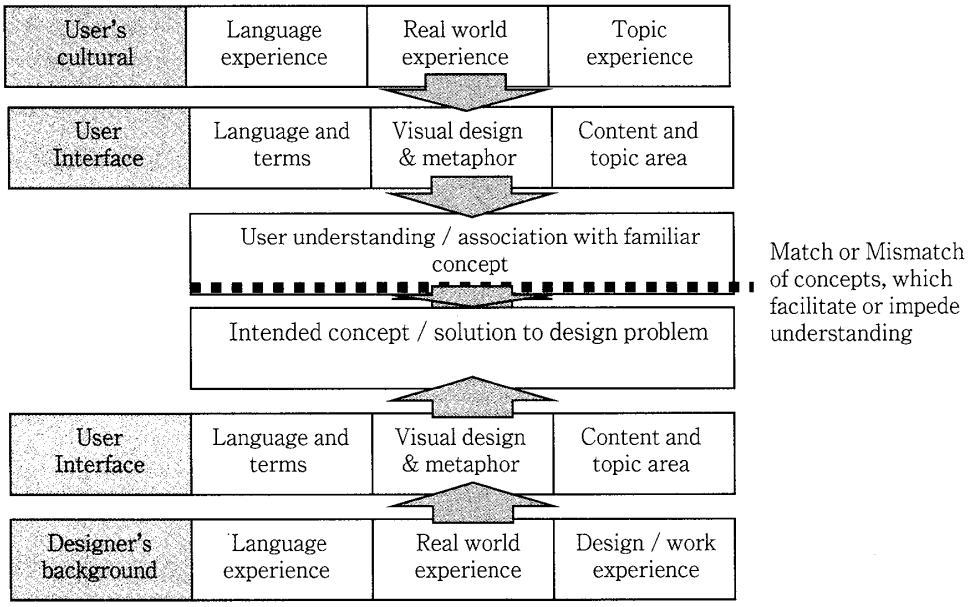

Figure 3. Misunderstanding of user interface items is likely to arise when the background of the users and the designers do not match up.

Experience with the distance learning context, website quality, information retrieval and navigation

The attitudes that participants had towards the DirectED website were evaluated by three questions during the observation debriefing. The questions 'Would you consider studying at DirectED?', 'What did you not like about the website?' and 'What did you like about the website?' were designed to gather information on the participants' feelings and attitudes towards the DirectED site after they had been exposed to it during the observation task.

In considering whether or not to study at DirectED most participants responded that they preferred not to. Among these were 19 of the 30 Americans, 20 of the 30 Japanese, 18 of the 30 English and 26 of the 30 Dutch. The reasons for this decision varied. The Americans mostly reported that they preferred a normal college and interacting with people. The Japanese did not want commit to either option because they did not feel they had received enough information to be able to judge. The English gave quite varied reasons and the Dutch preferred having contact with other people. Except for the Japanese, participants seemed to have realised that DirectED offers distance learning courses and that by studying with DirectED they would miss out on the social aspects of the college experience. However, particularly American and English participants sometimes mentioned that DirectED would be a good place for people who cannot leave home because they have children or a disability.

The aspects that participants disliked most about the site were very diverse for the Americans and included 'no real life pictures', 'some of the links didn't work' and 'needs more detailed information'. The Japanese reported being unhappy with the English text and having too much text to read. They also mentioned that there was a lack of information on the site and that there were not enough pictures and actual photographs. The English also mentioned that there was not enough information available on the site. The Dutch thought the information was not clear and sometimes even obscure, that it would have been better if it had been in Dutch and that there was not enough information on the site. Understandably, the site would have been more accessible to the Dutch and the Japanese if it had been in their native language. There was a great deal of text on the pages and participants had difficulty finding the information they needed.

The graphics of the homepage campus were most often mentioned as the aspects of the website that were liked most. This was mentioned by 11 Americans, 20 Japanese,10 English and 20 Dutch. The colourful pictures and the simple layout seemed to have been most appealing to the participants. The Japanese mentioned that the picture on the homepage was nice and 'easy to understand'. The Dutch mentioned that the graphics were nicely drawn.

Expression of perceived quality was different for each of the groups. For the Americans, dissatisfaction and satisfaction with the page was mostly expressed by commenting on each part of the site individually and afterwards come to a general verdict. The Dutch openly laughed out loud or made negative remarks about aspects of the page while evaluating. The Japanese were more reserved and worried, because they were not sure what to do. The English like the Dutch were more open about their feelings towards the site, they would freely criticise aspects when they were deemed 'stupid' and would laugh at parts they found amusing.

Out of the participants responses, it seemed that experiences of the DirectED website was built up out of several components:

- Experience of DirectED as an institution
- Experience of information on the site
- Experience of the visual design of the site
- Experience the concept of distance learning

These experiences seemed to be different for the different cultural groups. The Japanese and Dutch experience of the information on the site was that there was too much English text. The English and Americans thought there was not enough detailed information. If the Dutch and Japanese had been able to read the English text more easily, they may have come to a similar conclusion. However, part of the background of the Japanese and Dutch they have in common is that their knowledge of English is not as well developed as native English speakers. Figure 4 conveys these findings.

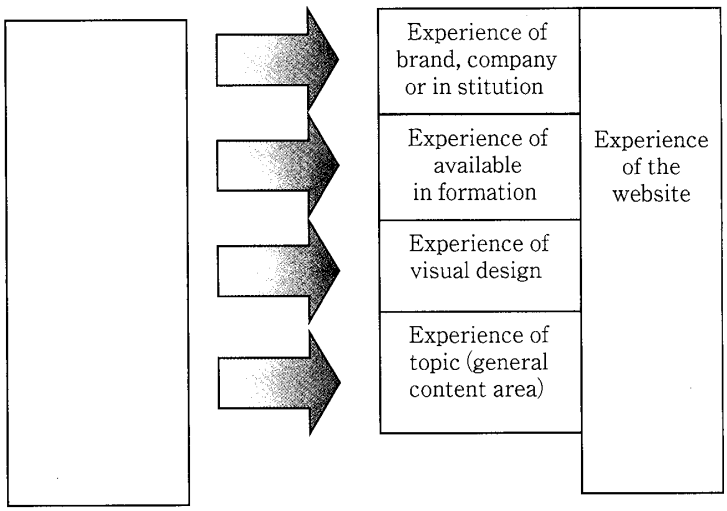

Figure 4. Users' cultural background influences experience of components of the DirectED website (i.e. the educational institution, information, design and educational context). Together, these experiences form the general experience of the site.

Indeed, users' understanding of the rest of the world was found to influence their perception of the interface's origin. Japanese users found the interface to look 'foreign' and therefore associated it with America, their immediate idea of a 'foreign' country. English users associated the interface with America also, only this time because the design reminded them of American television shows. The way that people perceive and gather knowledge about other cultures is thought to be influenced by their cultural background. The information people receive about other countries through education and media is determined by historical events and relations as well as the political climate of the culture they live in. Because of this, people from different cultures will perceive a foreign country in different ways. Therefore, their understanding of a product from that country (such as an interface) is thought to differ across cultures.

The finding that North-American users often perceived the DirectED interface as 'general' or 'normal' was interesting as it may have an impact on North-American interface development. It is possible that only North-American users perceive 'American' interfaces as general because of the originally North-American nature of software and the Internet. Dutch users for instance, may recognise Dutch websites as being 'Dutch' rather than 'general'. Future research may provide more insight into this. If this finding is found to be a more general occurrence it may mean that especially for North-American developers and designers, localising interfaces is a difficult task. Other cultures may be more aware of their own cultural design aspects than North Americans are and designing for another culture may therefore be more complicated for North American designers and developers. The importance of international usability research would therefore be even more relevant for North American development companies.

Another interesting finding was that users from different cultures had different information needs to accomplish the same task on the website. These different information needs reflected those aspects, which participants found critical for the task within their own cultural environment. An example of this was the task to find out what they would look for in a university. Some Americans reported that the status of a university was important whereas some Dutch found the city where the university was located important. These preferences and values influenced the search strategies that users implemented while looking through the DirectED website. As such, culture and culturally influenced values and preferences may influence user information search strategies while performing tasks on the web.

An unexpected finding was that each of the groups seemed to adopt different approaches to accomplishing their tasks. The Americans adopted a very structured approach in their problem solving, establishing what information they would need

and then searching for that information in a structured way. The Dutch used a very unstructured approach, randomly clicking around the site to form a more general view of the website which they then applied to deduce the answer to their problem. The English adopted an approach somewhat in the middle. The Japanese were unable to adopt an approach, as they felt insecure about their ability to solve the problem. This was thought to be partly influenced by the individual nature of the task whereas Japanese are known to be collective problem solvers. This finding could indicate that localisation of interfaces should also include support for local problem solving strategies

6. CONCLUSIONS

The findings of this research suggest that in international interface usage, difficulties in understanding for culturally diverse user groups exist on several different levels:

- Differences in real world experiences influence understanding of the design metaphor and individual design items
- Differences in knowledge of language(s) influence understanding of textual elements (especially for non-native speakers of the language used in the interface)
- Differences in information-needs and problem solving strategies influence navigation and perceived usefulness of the website

The findings showed that for each of the four cultural groups, there were different issues that impeded understanding and therefore usability of the interface. In order to understand the interface, participants needed to have an understanding of the metaphor, the text, the graphics and the information on the website and all of these aspects needed to correspond with familiar constructs. This was often not the case for the DirectED website. This suggests there is a considerable level of detail needed to ensure user understanding (i.e. the label, the picture, the information all need to 'make sense'). Because of this it would be unlikely that a 'universal' (one which suits all) design could be developed. Even if all users were able to speak English to some extent, merely simplifying the textual elements and the graphics is not expected to ensure cross-cultural understanding as users associate text and graphics with familiar terms and aspects of their own lives. An example is that, even though all the participants in the research understood the word 'student' and the word 'centre', they associated different real life expectations and value orientations with the icon of the 'Student Centre'.

The research therefore suggests that localisation of the interface would improve

usability of a product as it is used by users of a different culture. The research suggests that especially for North American designers, localisation may be a complex process as they may be less aware of the North-American context of their design. Because of this, localisation by a local development team within the target culture may be preferred. Localisation of the interface for a particular target cultural market should not only entail incorporating the local language(s) but also the design metaphor should be based on a local real world counterpart, the graphics should represent concepts users are familiar with and the local problem solving techniques and information needs should be catered for.

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